

Appl. No. 09/520,249
 Amdt. dated April 16, 2007
 Reply to Office Action of January 17, 2007

Docket No. 99-009

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REMARKS / ARGUMENTS

Claims 33-35 and 42-45 remain in this application. Claims 1-32 and 36-41 are canceled, without prejudice. Claim 45 is new.

Basis for Amendments

Applicants submit that the current amendment to claim 33 does not add new matter to the present application. The amendment finds basis in the present specification as follows.

In processing aid ("PA"), the presence of hard stage is on p. 17, lines 19-22 and lines 24-25. The option of 100% hard stage is on p. 17, lines 23-25.

The percentage of hard stage in the PA is found as follows. The present specification states, "PA compositions useful under the present invention are set forth in Examples 4, 5, and 7" (p. 19, lines 1-2). The stages of the processing aids described in Examples 4, 5, and 7 can be analyzed by the well-known Fox equation to determine their Tg's. The results are as follows:

<u>Example No.</u>	<u>Stage</u>	<u>Tg</u>	<u>Percent</u> (weight of stage based on weight of PA)
4	first	20°C	60%
4	second	105°C	40%
5	first	41°C	25%
5	second	105°C	75%
7	only	98°C	100%

The three examples have from 40% to 100% of "hard" (i.e., Tg of 25% or higher) stage.

The use of uncrosslinked hard stage is found on p. 18, lines 11-12.

The description of each stage as a "polymer" is found throughout the present specification. For example, a "additional stage or shell" is described as containing "homopolymers or copolymers" (p. 15, lines 26-28). For another example, the soft stages of PAs are called "copolymers" (p. 17, lines 26-28). For a third example, the hard stages

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of PAs are disclosed to be formed from monomers (p. 18, line 7) and are disclosed to have molecular weight adjusted by chain transfer agents (p. 18, line 17), making it clear that each stage, including the hard stage of the PA, is a polymer.

Applicants submit that the features of new claim 45 do not add new matter to the present application. The features recited in new claim 45 are found in the present specification as follows.

Use of matrix resin in the form of powder is on p. 10, lines 19-22.

Use of matrix resin in the form of slurry or wetcake is on p. 7, lines 4-6.

Novelty of claims 33, 35, 42, 43, and 45 over GB'185

In the above-identified Office Action the Examiner rejected claims 33, 35, 42 and 43 under 35 USC §102(b) as being anticipated by GB 1,230,185 ("GB'185").

In the above-identified Office Action, the Examiner states that "the graft copolymer elastomer of the reference is seen as fulfilling the roll of the polymeric processing aid in light of the definition of this component in instant claim 35."

Applicants submit that the graft copolymer elastomer of GB'185 is a different material from the processing aid recited in the final "wherein" clause of currently amended claim 33. The composition of currently amended claim 33 requires the presence of at least one processing aid that has a hard stage that meets these three criteria: the hard stage is uncrosslinked; the hard stage has Tg of 25°C or higher; and the hard stage makes up 40% to 100% of that particular processing aid.

GB'185 describes an additive polymer that has a first stage that is a butadiene polymer or a butadiene-styrene copolymer (p. 1, lines 83-84). GB'185 refers to this first stage as "rubber" (for example, p. 2, line 61, and p. 2, line 74). It is well known that the term "rubber" means a material with Tg below 25°C. For example, L. P. Smith defines "rubber" in The Language of Rubber (excerpt attached) that can be stretched to at least twice its length (and will then retract) at room temperature. Materials that have Tg of 25°C or above clearly do not meet the definition of rubber, because they will not stretch and retract as described by Smith at room temperature. Thus, the first stage of the additive polymer in GB'185 has Tg below 25°C.

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The second stage of the additive polymer in GB'185 contains crosslinking agent (p. 1, lines 76-79).

In sum, none of the stages of the additive polymer in GB'185 meets the criteria for the hard stage required in the composition of currently amended claim 33. Therefore, Applicants submit that GB'185 does not disclose the composition of currently amended claim 33, and so Applicants submit that currently amended claim 33 is novel over GB'185.

Applicants further submit that claims 35, 42, 43, and 45 because they are dependent on currently amended claim 33, are likewise novel over GB'185.

Comment on present claim 35

Applicants wish to note that present claim 35 encompasses a variety of embodiments. In some embodiments, the processing aid for PVC (i.e., the "PA") recited in present claim 35 may be the same PA as that recited in the final "wherein" clause of currently amended claim 33. In some embodiments, the PA recited in present claim 35 may be an additional PA, different from the PA recited in the final "wherein" clause of currently amended claim 33. An example (illustrative but not limiting) of an embodiment that includes two PA's is an embodiment that contains one PA that is 100% hard stage (for example, as in present Example 7) and a second PA that is 100% rubbery core (as described, for example, in the present specification, p. 19, lines 3-4).

Novelty of new claim 45 over GB'185

Applicants wish to note additional reasons for the novelty of new claim 45 over GB'185.

First, Applicants respectfully maintain that GB'185 does not disclose mixtures that are made by combining dry (or partially dry) matrix resin with aqueous additive. The Examiner, in the above-identified Office Action, states that

"the language of the reference leaves open the possibility of the PVC being in dry form since it is being added to a latex which can result in the mixture being predominantly liquid and subject to process steps typically applied to latex."

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Applicants respectfully disagree. GB'185 teaches mixtures of matrix polymer with additive in which the amount of matrix polymer is "99 to 80 percent by weight" (p. 1, line 98). Applicants submit that mixing PVC in dry form with a latex additive in such proportions could not yield a mixture that is "predominantly liquid."

Therefore, Applicants maintain that GB'185 discloses mixtures made in only two ways: dry PVC with dry additive, and latex PVC with latex additive. Thus, Applicants maintain that GB'185 does not disclose mixtures made by combining dry or partially dry matrix resin with aqueous additive.

Second, in the above-identified Office Action, the Examiner states that "applicants' composition claims are not seen as distinguishing over the compositions of the reference even if the latter are limited in interpretation to a combination of two lattices." Applicants respectfully disagree. It is well known that blending a powder with a latex creates a type of inhomogeneity that is not present in powder-powder blends and is not present in latex-latex blends. Thus, the physical form of a mixture of dry or partially dry matrix resin with aqueous additive is different from that of the compositions disclosed by GB'185. Therefore, Applicants submit that the compositions of new claim 45 are distinguishable from those of GB'185 on the basis of their physical form.

In sum, Applicants submit that, in addition to the composition differences described herein above regarding currently amended claim 33, the compositions of new claim 45 are made by different methods from the methods of GB'185 and also have different physical form from the compositions of GB'185. Consequently, Applicants submit that these further differences provide additional reasons why new claim 45 is novel over GB'185.

Novelty of claims 33, 34, and 42-45 over Newman

In the above-identified Office Action the Examiner rejected claims 33, 34, and 42-44 under 35 USC §102(b) as being anticipated by US 2,935,763 ("Newman").

Applicants submit that the rubber latex additive disclosed by Newman is a different material from the polymeric processing aid for poly(vinyl chloride) recited in currently amended claim 33. The description of rubber latex additive that is disclosed in

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Newman (col. 5, line 47 to col. 6, line 9) does not include any hard stage. In this passage, the disclosure of Newman regarding "copolymers" clearly refers to copolymerization of monomers to form a single "rubbery copolymer" (col. 5, line 52) and does not disclose or suggest multi-stage polymerization or the presence of any hard stage. Thus, the additives disclosed by Newman are rubbery materials that do not have any hard stage. As discussed herein above, by definition, these "rubbery materials" have Tg of below 25°C.

In Example 11, Newman discloses other materials that may be added to the mixture of PVC resin with rubber latex. These materials include stabilizers, zinc stearate, and white mineral oil. None of these materials is a polymer with Tg of 25°C or higher.

In contrast, the composition of currently amended claim 33 includes at least one aqueous additive that is a polymeric processing aid for poly(vinyl chloride) that has 40% to 100% by weight of a polymer stage having Tg of 25°C or higher. Therefore, Applicants submit that the compositions recited in currently amended claim 33 are different from the compositions disclosed by Newman, and thus Applicants submit that currently amended claim 33 is novel over Newman.

Applicants submit that claims 34 and 42-45, because they are dependent on currently amended claim 33, are likewise novel over Newman.

Conclusion

In view of the foregoing amendments and arguments, Applicants respectfully request the Examiner to reexamine the claimed subject matter, to withdraw the rejections of the claimed subject matter and to allow claims 33, 34, 35, and 42-44 at this time.

If there remain any open issues which the Examiner believes can be resolved by a telephone call, the Examiner is cordially invited to contact the undersigned agent.

No fees are believed to be due in connection with the submission of this amendment; however, if any such fees, including petition or extension fees, are due, the Commissioner is hereby authorized to charge them, as well as to credit any overpayments, to Deposit Account No. 18-1850.

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Attachment:

*L.P. Smith, The Language of Rubber,
Butterworth-Heinemann Ltd, Oxford, U.K., 1993
p.3*

1

Introduction

Rubber has been used in engineering applications for well over one hundred years. Yet engineers and designers still have difficulty in correlating the terms and expressions used by the rubber technologist with those they use themselves. Tensile strength, hardness, elongation, and creep, for example, are terms familiar to engineers but their meaning in rubber technology can often be quite different. *The Language of Rubber* is an attempt to explain these differences and to provide basic information which will help in the design of satisfactory components made from rubber. It will also indicate how to specify rubber in a manner which will enable the components to be made economically and to give the performance in use that is required.

1.1 What is rubber?

Rubbers are loosely described as materials which show 'elastic' properties. Such materials are generally long chain molecules known as 'polymers' and the combination of elastic and polymer has led to the alternative name of 'elastomers'. Rubbers and elastomers will be considered to be synonymous in this work.

One easily understood definition of a rubber or elastomer is a material which at room temperature can be stretched repeatedly to at least twice its original length and, upon immediate release of the stress, will return with force to approximately its original length.

1.2 Natural and synthetic

Natural rubber (NR) is generated in the *Hevea brasiliensis* tree as an emulsion of cis-poly-

isoprene and water, known as latex. The milky liquid is exuded from the tree when it is cut and is collected in small cups. Latex is also obtained in small quantities from the Guayule shrub. The latex is coagulated and then dried to produce a clear crepe rubber. If it is dried in the presence of smoke it becomes a light brown colour and is called smoked sheet. Natural rubber was the only rubber available for more than a century but the growth in the demand for tyres has outstripped the available supply and today NR represents less than 33% of the total usage of rubber.

Synthetic rubber is prepared by reacting suitable monomers to form polymers and can be obtained as a water emulsion or as a suspension in water or solvents. Small quantities of methyl rubbers were made during the First World War but the first commercially successful synthetic rubber was Du Pont's Neoprene, polychloroprene rubber, introduced in 1931. Since that time, Du Pont alone has introduced nine distinct groups of synthetic elastomers and there are no less than eight general classes of synthetic rubber, with 44 sub-classes, listed by the American Society for Testing and Materials (ASTM).

1.3 Compounding

The raw or base polymers vary from soft plastic materials to tough gristy substances and, generally, they are not suitable for use in the form in which they are supplied. Their elastomeric properties have to be developed by further compounding and the possible permutations and combinations are infinite. Fillers, such as carbon black and finely ground silica, can be used to provide reinforcement; oils, waxes and fatty acids can be used to improve processability and colours can be